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RESEARCH NOTE

Results of two worldwide surveys into physician awareness and perceptions of extended-spectrum β-lactamases

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ABSTRACT

An omnibus survey of microbiologists (n = 400) and a survey of participants (n = 49) in the Meropenem Yearly Susceptibility Test Information Collection (MYSTIC) programme were conducted to determine the awareness and prevalence of extended-spectrum β-lactamases (ESBLs), and the regularity and method of screening. Of the omnibus survey participants, 69% screened regularly for ESBLs, compared with 83% of MYSTIC participants. In both surveys, ESBLs were more common in *Klebsiella pneumoniae* (73% and 79%, respectively) and *Escherichia coli* (63% and 81%, respectively) than in other bacteria. The surveys demonstrated that awareness of, and testing for, ESBLs is inconsistent.

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In order to make informed prescribing decisions, clinicians need accurate information on the likely antibiotic resistance profile of the organism causing the infection. Surveillance studies, such as the Alexander Project, SENTRY and the Meropenem Yearly Susceptibility Test Information Collection (MYSTIC) programme, have been useful in providing accurate prevalence rates of specific bacterial resistance caused by different mechanisms, such as extended-spectrum β-lactamases (ESBLs) [1–3]. Infections caused by ESBL-producing pathogens may be associated with increases in mortality, duration of hospital stay and hospital costs [4,5]. However, awareness of the clinical importance of ESBL-producing strains may vary considerably among clinicians and microbiologists, with continued surveillance and testing not performed widely, and especially when the prevalence of resistance is low. Therefore, two global surveys, an omnibus survey and a survey of participants in the MYSTIC programme, were conducted to determine the degree of awareness of ESBLs, the methods and frequency of ESBL screening, and the reasons for not screening.

The omnibus survey comprised a panel of microbiologists who participate regularly in telephone interviews conducted by ISIS Research (Putney, London, UK), an independent market research agency. The respondents were not given advance notice of the questions, and so were asked to give an estimate when asked for percentages. All participants in the MYSTIC programme were sent a questionnaire. The two surveys were performed during February and March 2002. Both surveys included similar questions relating to perception of the incidence of

ESBL-producing isolates, screening practices, and the detection methods used (Table 1).

In total, 400 participants from 11 countries worldwide participated in the omnibus telephone survey. The self-completed questionnaire was returned by 49 participants (of 81 participants contacted) from 25 countries worldwide in the MYSTIC programme.

In the omnibus survey, respondents were based in a laboratory belonging to a non-specialist unit (55%), an independent laboratory unattached to a hospital (23%), a hospital (11%), or universities and external laboratories (11%). Of all respondents, 49% had taken part previously in antibiotic resistance surveillance programmes.

Respondents from the MYSTIC programme analysed samples from intensive care units (25%), neutropenia units (13%), independent units (11%), non-specialist units (8%) and cystic fibrosis centres (6%). The remaining participants (37%) worked in universities or external laboratories.

Of the omnibus survey participants, 69% screened regularly for ESBLs, and 82% of these had screened for ESBLs within the past month. Of the participants who had screened for ESBLs within the past month, 64% were participating in surveillance studies. Of the 31% of respondents in the omnibus survey who did not screen regularly for ESBLs, most (73%) were not participating in surveillance studies. Many (41%) of the microbiologists in the omnibus survey who did not screen regularly for ESBLs felt that it was unnecessary. Other reasons for not screening regularly were a lack of facilities or funds (26%), or that screening was dealt with by others (12%). A large proportion (83%) of the MYSTIC participants screened regularly for ESBLs, and 62% of these had screened within the past month. In both surveys, most participants who screened for ESBLs did not identify them (51% and 67%, in the omnibus and MYSTIC surveys, respectively).

The test used most commonly to detect ESBLs in both surveys was the double-disk synergy test [6], used by 47% and 57% of respondents in the omnibus and MYSTIC surveys, respectively. However, the Etest ESBL screen (AB Biodisk, Solna, Sweden) was thought to be the most efficacious method by 27% and 40% of participants in the omnibus and MYSTIC surveys, respectively.

In the past 12 months, most participants in both surveys reported finding ESBLs in *Klebsiella pneumoniae* (73% and 79% of participants, respectively) and *Escherichia coli* (63% and 81% of participants, respectively) more often than in other bacteria (Fig. 1). The overall prevalence, as estimated by participants in the omnibus survey, of ESBL-producing *Enterobacter cloacae* was 17%, with 13% of *K. pneumoniae* and 9% of *E. coli* isolates also thought to be ESBL producers. Most participants in both surveys were very, or extremely, concerned about the incidence of ESBL-producing bacteria (52% in the omnibus survey, 66% in the MYSTIC programme). The remainder were only marginally or not at all concerned.

The results of the two surveys demonstrated that, despite the high prevalence of ESBLs worldwide, a considerable sub-section of the participants

Table 1. Overview of the two surveys on awareness and perceptions of extended-spectrum β-lactamases (ESBLs)

Subject
Demographics
What type of ward or unit does your laboratory belong to?
Do you belong to an antibiotic resistance surveillance survey. If so, which one?
Frequency of screening for ESBLs
When did you last screen for ESBLs?
If you do not regularly screen for ESBLs, why not?
Prevalence of ESBL-producing isolates
During the past 12 months, specifically for your laboratory, in which of the following bacteria[a] have you found ESBLs?
In each of the bacteria you have listed, approximately what percentage of isolates produce ESBLs?
Prevalence of ESBL types
In your experience, during the past 12 months, which ESBL types predominate?
Methods for detecting ESBLs
In general, which method do you employ to detect ESBLs?
In your view, which method is most efficacious?
Methods for typing ESBLs
In general, which method do you employ to type ESBLs?
In your view, which method is most efficacious?

[a]*Klebsiella pneumoniae*, *Klebsiella oxytoca*, *Escherichia coli*, *Proteus mirabilis*, *Morganella morganii*, *Enterobacter cloacae*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Acinetobacter anitratus*, *Acinetobacter lwoffii*, *Acinetobacter calcoaceticus*, *Serratia marcescens*, *Citrobacter* spp.

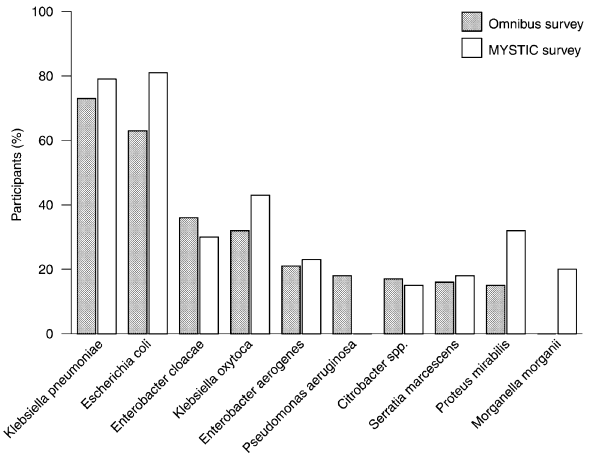

Fig. 1. Participants in the omnibus and MYSTIC surveys reporting ESBL production among key pathogens within the previous 12 months

did not screen for these enzymes. Respondents from the MYSTIC survey were more likely to screen for ESBLs, and were more concerned about the incidence of ESBL-producing bacteria than respondents from the omnibus survey. This is not surprising, as participants in surveillance studies may be more aware of the issue of antimicrobial resistance, which may be their initial reason for enrolling in a surveillance study.

In both surveys, many participants who screened for ESBLs did not identify them further, either because it was thought unnecessary, or because of lack of funding or facilities. Identification of the particular type of ESBL that a resistant organism produces will reveal the antibiotic resistance profile of the organism and may help clinicians to choose the most appropriate therapy [7]. Where high prevalences of ESBL producers are demonstrated as a result of surveillance studies or screening, an appropriate initial empirical therapy that covers ESBL-producing strains should be considered. The double-disk synergy test was the most common test used to detect ESBLs in both surveys, but the Etest ESBL screen was thought to be the most efficacious method. The most appropriate screening methodology should therefore be determined locally, according to local resources.

Overall, the surveys demonstrated that awareness of, and testing for, ESBLs is inconsistent. Since ESBLs have an influence on morbidity and mortality, and are associated with clinical failure, it is important to increase the level of awareness and frequency of testing for ESBLs.

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RESEARCH NOTE

Evaluation of a cefoxitin disk diffusion test for the routine detection of methicillin-resistant *Staphylococcus aureus*

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ABSTRACT

Two oxacillin disk methods were compared with a cefoxitin disk diffusion test for detection of methicillin-resistant *Staphylococcus aureus* (MRSA), with PCR for *mecA* as the reference method. When tested with 115 MRSA and 350 methicillin-susceptible *S. aureus* isolates, the cefoxitin disk test (specificity 100%, sensitivity 96.5%) was superior to the oxacillin disk methods (specificity 99.1%, sensitivity 90.4%). Testing with both oxacillin and cefoxitin disks would give better sensitivity (100%) than the cefoxitin test alone, but at the expense of specificity (99.1%). The cefoxitin disk test required no special test conditions and would

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